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3400 Forest Pest Management August 31, 1981

Tuliptree Scale Evaluation - Brownstown RD

Forest Supervisor
Wayne-Hoosier National Forest

On August 18, Larry Yarger, FPM, with Dave Donley and Dave Feicht, NEFES, and Richard Burt of *your* staff, examined 13 yellow-poplar plantings on the Brownstown Ranger District for incidence of the tuliptree scale, Toaeyella liriodenri (Gmelin). This examination was a followup to the initial service trip made by Larry Yarger with Donald Kinerson and Ralph Willard on August 4. The 13 plantings examined were (maps enclosed):

Planting	Compartment	Stand	Acres	Year of Origin
I	62	15	10	1974
2	68	9	22	1971
3		.23 11	23	1971
4	70	18	34	1971
5	71	37	9	1974
6	32	6	16	1970
7	34	2	10	1969
8	34	24	12	1969
9	37	1	15	1969
10	42	4	10	1968
11	40	28	1	1973
12	54	2	55	1968
13	63	46	20	1973

Tuliptree scale infestations can cause growth loss and branch and tree mortality. The terminal shoots of infested trees are often killed, causing crooks which affects the trees' future use for wood products. All 13 plantings examined have some degree of infestation. Four plantings, numbers 3, 12, 13, and 14 were found having a level of scale infestation that might affect the Forest's land management objective of maintaining a hardwood cover on acquisition lands. Plantings #3, #12, and #13 were evaluated on August 19 by Larry Yarget to assess scale populations and possible need for pest management action to prevent an unacceptable level of scale damage. Planting #14 was not evaluated since competing vegetation is already causing tree growth loss and mortality.

The evaluation of plantings #3, 12 and 13 consisted of estimating the percent of branches on randomly selected yellow-poplar trees that contain 30 or more female scales. During investigations with the tuliptree scale, Dave Donley found that as few as 30 females per branch was an Indication that heavy tree growth loss and mortality would occur. For this evaluation, the following infestation categories were used:

0 - no branches with 30 or more female scales
1 - 1-30 percent of branches with 30 or more female scales
2 - 31-70 percent branches with 30 or more female Fcales
3 - 71-100 percent branches with 30 or more female scales

Our evaluation identified the percentage of yellow--poplar trees within each planting that were severely infested and subject to heavy branch mortality and entire tree mortality. The incidence of predation by the moth Taetila coccidivora (Comet.) and ladybird beetles ily ernpis sp. and Chlocosus sp. appeared insignificant in the plantings that were evaluated. The height for each tree surveyed '.'as eetim ted to the nearest foot.

The results of this evaluation are as follows:

Planting/12, Compartment 54, Stand 2

Acres - 55
Trees Surveyed - 150
Average Tree Height - 8 feet
Infestation Categories: 0 - 64 trees or 42 percent
1 - 22 trees or 15 percent
2 - 22 trees or 15 percent
3 - 42 trees or 28 percent

Planting 13, Compartment 68, Stand 11

Acres - 23
Trees Surveyed - 50
Average Tree Height - 9 feet
Infestation Categories: 0 - 23 trees or 46 percent
1 - 6 trees or 12 percent
2 - 8 trees or 16 percent
3 - 13 trees or 26 percent

Planting #13, Compartment 63, Stand 46

Acres - 20
Trees Surveyed - 200
Average Tree Height - 6 feet
Infestation Categories: 0 - 110 trees or 55 percent
1 - 18 trees or 9 percent
2 - 15 trees or 8 percent
3 - 57 treed or 28 percent

The results of this evaluation indicate that branch and terminal shoot mortality (infestation categories 1-3) can be expected to occur on approximately 58 percent of the trees in planting #12; 54 percent ie planting #3; and 45 percent in planting #13. Jaing infestation category 63 en an indicator of potential severe tree dr..mage. then t:ee mortality -.en be expected as follows:

28 percent in planting #13; 26 percent in planting 03; and 28 percent in planting #13. The scale was observed on all trees in the plantings evaluated, therefore some degree of growth lose other than branch and tree mortality can be expected to occur on *11 trees. Based on general field observations and examination of the evaluation data, heavily infested trees appear to occur in groups of several or more trees.

Teller-poplar branch and tree mortality will occur in the plantings evaluated if action against the scale is not undertaken (no-action alternative). The degree to which these will occur has been estimated and is presented above. If, based on the results of this evaluation, the land management objectives for these plantings will be affected to an undesirable degree, then the Forest might consider a pest management action to suppress the current scale infestation. Peat management action alternatives include the application of a nondormant chemical insecticide, a dormant insecticide (oil) or banding the trunk of infested trees with tangle foot. These alternatives with considerations are presented below:

Alternative I -- Treatment with nondormant chemical insecticide. Chemical insecticides are most efficacous when applied to the crawler stage of the scale. Chemical insecticides registered with the U. S. Environmental Protection Agency for use against the scale and on a forested site include carbaryl, diazinon and malathion. These insecticides are considered contact insecticides; causing death when in contact with the target pest. Application systems would be backpack or truck-mounted hydraulic equipment. We are unaware of any systematic insecticides registered for use against the tulip-tree scale.

Considerations

1. Timing. Treatment is applied to the crawler stage which occurs from late August to early Fall. A limiting factor is the time necessary for administrative approvals and pretreatment preparation including EA, project work and safety plans,benefit/cost analysis, purchasing of insecticide and equipment rentals. This time factor could prohibit implementation of this alternative until next year.

2. Efficacy. Chemical insecticides.are efficacious against the tulip-tree scale when applied to the crawler stage.

3. Environmental. When :applied according to the label, EPA registered insecticides will not adversely affect human health or the environment. The use of chemical insecticides may not address public concern over the use of chemical insecticides. During the evaluation, several bird nests with eggs *or newly* hatched birds, were observed on scale infested trees.

4. Economic. A benefit/cost analysis for this alternative would likely deronstrate favorable economic efficiency. Insecticide and application costs per *tree* would be more than that for Alternative II or III.

Alternative II -- Treatment with dormant (oil) insecticide. **Dormant insecticides are, in general, miscible superior oils that are applied while the host is in the dormant or delayed dormant period. Several oil formulations contain a small percentage of chemical insecticide. The dormant insecticides that should be considered for tuliptree scale are those that contain only the oil ingredients. Application systems would be the same as for Alternative** I.

Considerations

1. Timing. Fall treatment would **be applied after leaf fall and before first freeze (mid-October to early December). Spring treatment would be applied after danger of freeze and before bud break. Time necessary for administrative approvals and pretreatment preparations might still be a limiting factor, although to a lesser degree than that in Alternative** I.

2. Efficacy. Dormant oil insecticides are efficacious **against the tuliptree scale.**

3. **Environmental.** Dormant oil insecticides are petroleum **products. Alternative** II would address **public** concerns **over** the use **of chemical** insecticides. Dormant **oil** insecticides **should not adversely** affect nontarget organisms including birds common to **old-field plantings. Yellow-poplar** is susceptible to oil injury; however, proper formulation and application procedures should prevent injury.

4. Economic. **A** benefit/cost **analysis of** this **alternative would likely demonstrate favorable economic efficiency. Insecticide** and application cost per tree would be less than that for **Alternative I and more** than **Alternative** III.

Alternative III -- Application of tanglefoot. Scales are **subject to predation and parasitism** by **various** insects. Several species of ants **gather "honeydew" excreted by** the scales. The ants, while gathering "honeydew" **interfere with** parasitism end predation. **A** band of tanglefoot arouri the trunk of **scale infested trees** inhibits ant movement, allowing biological pressure **to be exerted** on the scale population. Tanglefoot would be applied **using hand-held brushes.**

Considerations

1. Timing. Tanglefoot can be **applied** Spring **through Fall. Time necessary for administrative approvals and pretreatment preparations** would not *be a* **limiting factor.**

2. **Efficacy. Tanglefoct** banding has been effective in reducing scale populations where parasite and predators are exerting significant biological pressure. However, in the plantings **evaluated,** the incidence of predation or parasitism can be considered insignificant. Therefore, Alternative III would not be efficacious under current biological conditions.

3. Environmental. The use of tanglefoot would minimize direct adverse impacts on nontarget organisms except ants. Alternative III would address public concerns ever the use of insecticides.

4. Economic. A benefit/cost analysis for this alternative would likely demonstrate favorable economic efficiency. Material and application costs per tree would be leas than that for Alternative I or II.

The pest management action alternative preferred by Forest Pest Management for reducing scale damage is Alternative II; a Fall application of a dormant oil insecticide. The rationale for this preference is as follows:

1. Time necessary for administrative approvals and pretreatment preparation is not a critical limiting factor.

2. Dormant oil insecticides are efficacious against the tulip-tree scale.

3. Dormant oil insecticides should not adversely affect nontarget organises, particularly nesting birds common to old-field plantings.

4. A benefit/cent analysis for this alternative would likely demonstrate favorable economic efficiency.

If the Forest decides to implement a pest management action and request FPM funds, we will need a completed 3400-2 (enclosed) and supporting documentation (EA) as addressed FSM 3453.5. We initially foresee the Forest and FPM conducting the project with NEFES cooperation. Insecticide application equipment would have to be borrowed or rented. With good wee+then, a suppression project for the scale its the 3 plantings evaluated could be completed in about 1 week. larry 'larger will assist you in preparing the necessary documents and will coordinate FPt1 involvement and NEFES contacts.

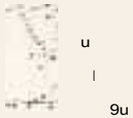
We would appreciate a response concerning your decision to conduct a suppression project as soon as possible to insure that adequate time is allowed for project planning and approval.

Please contact Larry YarEer or myself concerning any phase of this evaluation. Several publications on the tulip tree scale ire enclosed for your information.

ALLAN T. BULLARD
Field Representative
Forest Pest Management

Enclosures

cc: D. Donley, NEFES, Ilelawnre, ON
AO, FPM



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